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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/804,434	03/18/2004	Henry P. Moreton	NVIDP015A/P001241	7140

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EXAMINER	
AMIN, JWALANT B	
ART UNIT	**PAPER NUMBER**
2628	
MAIL DATE	**DELIVERY MODE**
09/20/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/804,434	MORETON ET AL.	
	Examiner	Art Unit	
	Jwalant Amin	2628	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 July 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-3 and 5-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3 and 5-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, see pages 5-9 of applicant's remarks, filed 7/3/07, with respect to the rejection(s) of claim(s) 1-17 under U.S.C. 102 and U.S.C. 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Aleksic et al. (US 6175368; hereinafter Aleksic) and further in view of Cosman (US 6525740).

2. Regarding independent claims 1 and 5, the applicant argues that Aleksic does not teach "modifying based on a depth-component of the algorithm" and "modifying allows the lighting operation to display the interaction of displayed objects" (see pg. 7 last paragraph and pg. 8 first paragraph of applicant's remarks).

However the examiner interprets that Aleksic, in view of Cosman teaches exactly this. Please refer to the rejection of claims 1 and 5 below for further details.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1-3, 5-6, 8, 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aleksic, and further in view of Cosman.

5. Claims 1-3, 6, 8, 9, 16 and 17 are rejected under 35 U.S.C. 102(e) as being anticipated by Aleksic et al. (US 6,175,368; hereinafter referred to as Aleksic).

6. Regarding claims 1, 16 and 17, Aleksic (Fig. 1, Fig. 6, col. 3 lines 62-67, col. 4 lines 1-35, col. 9 lines 46-65, col. 10 lines 2-19 and lines 60-67) teaches a method and an apparatus (Fig. 1) for modifying a value (x) (N summed with ΔN) based on an algorithm (addition corresponds to algorithm); and performing an operation (dot product with light vector corresponds to the operation performed on the resulting/modified value) on pixel data taking into account the modified value (N + ΔN); wherein the value (N) is modified utilizing the equation: x + Δ (X), where Δ includes a value read from a texture map (N + ΔN corresponds to x + Δ (X); ΔN is obtained by using the coefficient B_u and B_v determined by utilizing the bumb map coordinates to access the bump map, which may be a texture map). Aleksic teaches modifying is based on the normal shading component (col. 3 lines 4-6).

Although Aleksic teaches the claimed limitations as stated above, Aleksic does not explicitly teach normal vector is related to the depth-component. However, Cosman teaches to calculate angular tilts U and V from the values in height map and stored in bump angle memory (col. 1 lines 55-57, col. 6 lines 15-50; the angular tilt of the bump map is considered as equivalent to the normal vector as both the angular tilt and the normal vector represents the curvature of the bump map; height map is the functional equivalent of a depth map; therefore, Cosman teaches to derive the normal vector from the depth map (depth-component), and Aleksic already teaches that modifying is based on the normal vector; values of height map corresponds to the depth value). Therefore,

it would have been obvious to one of ordinary skill in art at the time of present invention to calculate the angular tilts from the height map as taught by Cosman and apply it into the method Aleksic because by applying the local tilt to the surface normal of a bump texture map helps to crease illusions of bumps (col. 1 lines 55-57).

7. Regarding claim 2, Aleksic teaches the pixel data includes a normal value (vector N corresponds to the normal value), and further comprising modifying the normal value (N + ΔN; col. 9 lines 46-65, col. 10 lines 2-19 and lines 60-67).

8. Regarding claim 3, Aleksic teaches the operation includes a lighting operation (performing a dot product of N + ΔN with light vector L produces shadowing function for the particular pixel location; this operation corresponds to lighting operation; col. 9 lines 46-65, col. 10 lines 2-19 and lines 60-67).

9. Regarding claim 5, Regarding claims 1, 16 and 17, Aleksic (Fig. 1, Fig. 6, col. 3 lines 62-67, col. 4 lines 1-35, col. 9 lines 46-65, col. 10 lines 2-19 and lines 60-67) teaches a method and an apparatus (Fig. 1) for modifying a value (x) (N summed with ΔN) based on an algorithm (addition corresponds to algorithm); and performing an operation (dot product with light vector corresponds to the operation performed on the resulting/modified value) on pixel data taking into account the modified value (N + ΔN); wherein the value (N) is modified utilizing the equation: x + Δ (X), where Δ includes a value read from a texture map (N + ΔN corresponds to x + Δ (X); ΔN is obtained by using the coefficient B_u and B_v determined by utilizing the bumb map coordinates to access the bump map, which may be a texture map). Aleksic teaches modifying is based on the normal shading component (col. 3 lines 4-6).

Although Aleksic teaches the claimed limitations as stated above, Aleksic does not explicitly teach modifying allows a lighting operation to display an interaction of displayed objects. However, Cosman teaches to tune the modification values stored with a polygon to achieve correct brightness of the ocean within the specular area (col. 1 lines 55-57, col. 6 lines 15-67, col. 9 lines 6-15 and lines 35-67, col. 10 lines 1-54; the angular tilt of the bump map is considered as equivalent to the normal vector as both the angular tilt and the normal vector represents the curvature of the bump map; height map is the functional equivalent of a depth map; therefore, Cosman teaches to derive the normal vector from the depth map (depth-component), and Aleksic already teaches that modifying is based on the normal vector; wave bump map and ocean corresponds to displayed objects; raising the brightness of the scene to overall average brightness to compensate for the brightness decrease in areas near the specular highlight corresponds to applying a lighting operation). Therefore, it would have been obvious to one of ordinary skill in art at the time of present invention to allow lighting operation display interaction between displayed objects as taught by Cosman and apply it into the method Aleksic because such a method helps to decrease the brightness of the specular highlights in a well behaved way to control the highlight aliasing (col. 3 lines 25-27).

10. Regarding claim 6, Aleksic teaches the modifying allows the lighting operation to display bumpy shadows (dot product of light vector with $N + \Delta N$ produces a bump shadowing function for the particular pixel; this resulting shadow function is combined with rendered pixel data to produce the resultant display data for the given pixel; this

display data displays bumpy shadows; Fig. 6, col. 3 lines 4-9, col. 9 lines 46-65, col. 10 lines 2-19 and lines 60-67).

11. Regarding claim 8, Aleksic teaches the operation includes a shadow mapping operation (desired shadow function; col. 10 lines 8-19).

12. Claims 7 and 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aleksic and Cosman, and further in view of Leather et al. (US 6,664,958; hereinafter Leather).

13. Regarding claims 7 and 10-11, although Aleksic teaches all of the claimed limitations as stated above, Aleksic does not explicitly teach the operation includes a hidden surface calculation and that the value includes a clip-space z-value. However, Leather teaches to apply the pixel depth values resulting from the z blending operation to a hidden surface removal operation (col. 9 lines 55-67 and col. 10 lines 1-5; hidden surface removal operation corresponds to operation includes a hidden surface calculation; col. 9 lines 29-32, depth (z) corresponds to clip-space z-value; the examiner takes an official notice of the fact that it was known in art at the time of present invention that the depth coordinate z is known as w, when iteration of a coordinate for a non-projected texture takes place in the viewer's coordinate system). Therefore, it would have been obvious to one of ordinary skill in art at the time of present invention to use the hidden surface removal operation of Leather and apply it into the system of Aleksic because using hidden surface removal operation in conjunction with the z buffer allows

the z texture to control whether parts of the texture mapped image are occluded by other objects in the scene (col. 10 lines 3-5).

14. Claims 12-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aleksic and Cosman, and further in view of Demers et al. (US 6,700,586; hereinafter Demers).

15. Regarding claims 12 and 13, although Aleksic teaches all of the claimed limitations as stated above, Aleksic does not explicitly teach that X involves a projection transform, and X includes ($n * T_{proj}[y]$), where $T_{proj}[y]$ includes the projection transform, n includes a vector. However, Demers teaches to transform incoming texture coordinates, geometry or normals pertaining to a surface in object space into projected texture coordinates in homogeneous eye space (col. 8 lines 10-24, col. 9 lines 12-61; matrix transformation producing projected texture coordinates corresponds to projection transformation of the incoming texture coordinates or normals; normals [N_x, N_y, N_z] corresponds to vector; the dot product calculation between the normals and the matrix corresponds to ($n*T_{proj}[y]$)). Therefore, it would have been obvious to one of ordinary skill in art at the time of present invention to produce projected texture coordinates in homogeneous (eye) space using matrix transformation as taught by Demers into the system of Aleksic because matrix transformation could be used for any type of texturing dependent on the geometry of the object (e.g. environment mapping, reflection mapping, etc) (col. 10 lines 65-67 and col. 11 lines 1-5).

16. Claims 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aleksic, Cosman and Demers, and further in view of Jenkins (US 6,028,608).

17. Regarding claims 14 and 15, although the combination of Aleksic nad Demers teach all of the claimed limitations as stated above, they do not explicitly teach y equals three and y equals four. However, Jenkins teaches a case when viewpoint motion vector is parallel to view direction vector, object space x and y values are constant while z value varies (col. 53 lines 56-67, col. 54 lines 38; constant y corresponds to y=3 or y=4). Therefore, it would have been obvious to one of ordinary skill in art at the time of present invention to use constant values of y as taught by Jenkins into the system of Aleksic and Demers because these method gives exact results requiring fewer floating point operations than the floating point operations required for multiplication of a vector [x y z] by a general transformation matrix, and reduce the cost of transformation-projection (col. 54 lines 20-23 and lines 29-34).

Conclusion

18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- Foran et al. (US 5742749)

19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jwalant Amin whose telephone number is 571-272-2455. The examiner can normally be reached on 9:30 a.m. - 6:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Zimmerman can be reached on 571-272-7653. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

*** J.A. 9/15/07

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